Rebellion as a Quasi-Criminal Activity

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Economic models of rebellion usually treat it as a form of crime or banditry. However, the analogy is not developed. This article treats rebellion as a distinctive form of organized crime that differs from other crime in its objective, which is the predation of the rents on natural resource exports. Because such rents can be defended by government forces, rebel forces must be sufficiently large to defend themselves. This introduces a survival constraint that affects whether a rebellion is financially viable and how it reacts to increases in government forces and introduces an entry threshold. This threshold gives rise to a problem for the rebellion of attracting sufficient start-up finance. The predictions of the model are shown to be consistent with four stylized facts.

Although the popular descriptive literature on the impetus for civil conflict has focused primarily on group grievance, real or imagined, the analytic economics literature, set in a rational choice framework, has focused on predation. For example, Grossman (1999) models rebellion as the result of kleptocratic rivalry. Brito and Intriligator (1992) model rebels as suppliers of protected land to drug barons. Hirshleifer (1991) shows that it will generally be rational for the poor to engage in a power struggle against the rich to achieve a transfer of resources. One reason why economists are somewhat dismissive of grievance as a cause of rebellion is that the provision of justice, or grievance alleviation, is a public good and so faces acute collective action problems. However, even when recruits are willing to fight for a cause rather than for their own self-interest, predation may be the sole means by which a rebellion can sustain itself financially. Hence, the analysis of rebellion as if it were motivated by predation may have a more general application.

In the conventional economic analysis, rebellion is indistinguishable from crime. Grossman (1999, 269) is indeed explicit on this point: "In such insurrections the insurgents are indistinguishable from bandits or pirates." He argues that "the romantic notions of idealists notwithstanding, this characterization of revolutions as manifestations of kleptocratic rivalry seems historically accurate" (p. 268). Collier and Hoeffler (1998, 2000) find evidence to support this argument that greed is more important as a

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predictor of rebellion than is grievance. They test four proxies for grievance as a cause of conflict using the Singer and Small (1994) global data set on civil wars and find that neither social fractionalization by ethnicity and religion nor inequality of income and assets increase the probability of civil conflict. Indeed, where these variables are significant, they actually make societies safer.

However, even if rebellion is somewhat analogous to crime in general and organized crime in particular, it is by no means identical. There is a continuum in the scale of criminal violence, from the violent robbery perpetrated by one individual on another, through gangs and mafias, up to large-scale conflicts with the state. The question as to where on that continuum violence occurs is surely important. To date, the economics literature has not really confronted this question, which is essentially about the industrial organization of violent predation. Indeed, in conflating rebellion with crime, the economics literature on rebellion aggregates two phenomena that appear empirically to be differently organized and to have very different causes. Although empirical work on the differences between conflict and crime is still in its early stages, I will propose as "stylized facts" four differences that, although not based on conclusive evidence, seem to me to be reasonable priors. First, the incidence of civil conflict seems strongly related to the level of income: richer societies face a far lower risk of conflict than poor societies. However, richer societies do not seem to be similarly favored by a reduction in the incidence of violent crime. Second, increased income inequality appears not to increase the risk of conflict, whereas recent work on international comparisons of homicide rates shows it to be powerfully and significantly associated with higher criminal violence (Lederman, Loayza, and Menendez 1999). Third, natural resource exports are strongly associated with an increased probability of civil conflict (Collier and Hoeffler 1998, 2000). The relationship is nonmonotonic, but at the peak (around a quarter of gross domestic product [GDP] being generated by natural resource exports), the risk of conflict is around five times higher than in societies without such resources, controlling for other characteristics. There seems to be no work that tests for such a relationship in violent crime, but I will assume that any such relationship is less striking. Finally, even if rebellions are not caused by group grievances, they are surely in some way related to them. A convincing account of rebellion must therefore offer some explanation as to why rebellions so often adopt the discourse of grievance and the battle lines of ethnic, religious, or class divisions. Sometimes, this is also true of violent crime: criminals may justify their actions in terms of ethnic, religious, or class divisions. However, even in societies riven by such divisions, most violent crime typically occurs within rather than between communities, and so group identity appears to play a less important role.

In this article, I develop a model of rebellion that has features at least broadly consistent with these stylized facts. I retain the core assumption of the analytic economics literature that rebellion is motivated by greed. However, I argue that it is distinctive in the particular type of economic activity on which it is predatory and that this has consequences for the organization of the industry. In turn, this introduces severe constraints on entry to the industry, which may account for the common association of rebellions with issues of social identity and grievance. In the next section, I set out a model of rebellion in which the rebel objective is to loot natural resource rents on a continuing

basis. Victory over the government is not an objective, and so conflict is treated as an equilibrium phenomenon. In the following section, I consider how the model lines up against the four stylized facts discussed above. I then consider an implication of the model—namely, that although large-scale conflict can be profitable, it cannot get started because it is unviable at a smaller scale.

A MODEL OF LOOT-SEEKING REBELLION

A rebellion that erupts into civil war is a type of large-scale violence that meets certain criteria. In the criteria used in empirical studies, a civil war occurs only if the mortality rate from combat exceeds a particular threshold. The most common threshold is 1,000 battle deaths during a year. The deaths must occur in the context of violence between a government and an identifiable organized group, and at least 5% of the deaths must be on each side.

Thus, to be commensurate with empirical work, a model of rebellion should predict not just that conflict will occur but should also predict its scale. The larger is the predicted scale of conflict, the more likely are battle deaths to exceed the measured threshold. In effect, the empirical studies have identified not the correlates of conflict but the correlates of passing a threshold of battle deaths. Ceteris paribus, the mortality rate from a conflict will be an increasing function of the labor forces in the opposing armed forces. Obviously, there are exceptions to this: when forces become too unbalanced, one side may get slaughtered. However, such a situation is incorporated below as a constraint on the viable size of a rebel force. In choosing a simple functional form for the relationship between the size of the two forces and the mortality rate, it is evident that the relationship is to some extent multiplicative rather than additive. I will simplify by assuming the relationship to be entirely multiplicative. Denoting the rebel labor force by r and the government military labor force by g, the probability that the conflict has a mortality rate that exceeds 1,000 will thus be an increasing function of this product:

$$\text{War}_{\text{prob}}\, h(gr),\ h' > 0. \tag{1}$$

Empirically, this may not be a reasonable characterization. It may be that the death rate is much more sensitive to the size of rebel forces than to that of government forces. However, I am not aware of an empirical literature on this relationship. Given this assumption, the key variables to explain in a model of conflict are the two labor forces.

Evidently, some government military labor will exist with or without rebellion, whereas it is unlikely that rebel military labor can exist without violent conflict with government forces. Hence, in explaining conflict, the key step is to explain the rebel labor force. In particular, we are seeking the circumstances in which the rebel labor force will be large.

If rebellion is essentially a type of theft, then a model of rebellion should have many common features with a model of crime. In the model developed in this article, rebellion is a special case of crime, with all the differences from conventional crime arising as a consequence of the particular type of loot sought by rebels. Rebellions are a dis-

tinctive type of criminal activity in that the labor force engaged in the activity is both large and organized into a single enterprise.

The labor force engaged in criminal activity will tend to be larger the greater are the potential rewards from predation. Although virtually all types of economic activity are prone to some degree of predation from crime, some activities can sustain a much higher degree of crime than others without collapsing. At one extreme, a highly competitive and footloose activity such as manufacturing will simply move elsewhere if it is subject to severe crime. Hence, sustained high crime depends on the existence either of immobile wealth or immobile rents. Assuming an economy to be endowed with one or other of these lootable resources, now consider how the type of loot might affect the organizational structure of crime.

First, consider household wealth. Because households are geographically dispersed, such wealth is difficult to defend. The technology of household theft therefore needs only a very low level of violence to protect the criminal, who will generally depend on secrecy as the best means of self-protection. Secrecy implies diseconomies of scale in the organization of household theft: large gangs are more at risk of detection than solo operators while gaining a degree of self-protection from householder or police violence which is seldom useful. Although the household theft industry might have a large labor force, it will therefore be organized on a very small scale. Thus, even if the scale of violent deaths exceeds the threshold that would satisfy the definition of civil war, the absence of large-scale organization will prevent the phenomenon being classified as a civil conflict.

Now consider protection rackets. Such crime is distinctive in that it is not directly in the business of theft but rather produces and sells protection to businesses in specific localities, being predatory on the rents attached to location (Konrad and Skaperdas 1998; Skaperdas 1999). Because there can reasonably be presumed to be some scale economies in the production of violence, the optimal size of gang is greater than that appropriate for household theft. Furthermore, in response to organized defensive action, for example, through a police force, the gang may need to be larger to achieve a given level of menace. Thus, it becomes ambiguous whether policing reduces or increases the optimal size of the gang labor force. The scale economies in protection rackets produce an organization structure with larger enterprises than those engaged in household theft. Indeed, such organizations may not be very different from private police forces, offering protection from petty criminal activity. Because the economies arise essentially from internalizing the externalities that arise from policing a locality, the optimal scale is still likely to be too small for violence to meet the criteria of civil conflict. Such criminal organizations typically range from around 20 to around 500 employees.

Finally, consider rebellion. Empirically, rebellions tend to have labor forces in the range of 500 to 5,000. I will suggest that rebellion has some of the features of household theft and some of the features of a protection racket. It shares with household theft the objective of stealing goods: specifically, I will assume that the target for rebellion is the looting of natural resource exports. I will assume that these have two distinctive characteristics: high location-specific rents and geographic "choke points" at which either production is located, as in the case of mines, or trade is concentrated as in the

case of the transportation of export crops to a port. The high rents enable the activity to survive while supporting a high incidence of looting. The geographic choke points concentrate the activity of predation in a relatively few locations. A corollary of this concentration is that natural resource extraction is relatively easy to defend: either private or government forces can be deployed at the choke points. In turn, this makes small-scale crime ineffective because criminals are not able to rely for self-protection on evasion. This gives rise to scale economies that make rebellion analogous to organized crime. However, whereas the protection racket needs only a sufficient scale to menace petty traders into paying up while staying silent, rebellion must face the problem of how to protect itself while confronting the forces that defend the choke points. The rebels do not necessarily need to be able to defeat such forces, but they need to be able to survive as an organization despite confronting them. Thus, the optimal organizational structure for rebellion targeted at a single national choke point is likely to be national monopoly.

In the present model, the motivation for rebellion is to acquire revenue through predation of natural resources. Let gross revenue from looting, R, be a function of the rebel labor force; r, the value of natural resource exports; ny, (n, ranging from 0 to 1, being the proportion of income, y, coming from natural resource exports); and the amount of protection labor supplied by the government, g:

$$R = R(ny, r, g), R_n > 0, R_r > 0, R_g < 0. \tag{2}$$

The rebel leader can recruit labor by offering recruits an income related to the opportunity cost of labor in the economy, the required income being w_r. Thus, the rebel leader's decision problem is

$$\max_r R - w_r r, \tag{3}$$

with the constraint that the activity of rebellion will only exist subject to (3) being nonnegative. Grossman (1999) assumes that the rebel leader can simply hire from the national labor force without constraints as if it were a normal firm. However, a rebel military organization faces formidable problems of contract enforcement with its staff, which a normal type of organization can resolve through resort to the law. One evident problem is that military secrets must be shared among a relatively large group of people, so that the government has an incentive to bribe such people into defection. A second problem is the maintenance of hierarchy. Successful military action depends on officers being given operational command of their troops, but this makes it relatively easy for such officers to contest the leadership of the rebellion. The typical solution that rebel leaders adopt in response to these problems is to confine recruitment to those strata of the population that enable the rebel organization to be cohesive. Recruits share a common ethnic, religious, or class background. Indeed, mafia organizations, which face similar problems but on a much smaller scale, appear to adopt a similar solution (Skaperdas 2000). We can think of these constraints on the size of the organization as imposing a cost of recruitment that varies depending on the characteristics of the society. For given sizes of society and of rebel organizations, the cost of cohesion in the organization rises with the degree of fragmentation of the society, f, as well as more

obviously rising with income. To derive results, it is useful at this stage to adopt specific functional forms for relationships. Thus, the effect of ethnic fragmentation and income on wages will be specified as

$$w_r = \beta y^{1+f}. \tag{4}$$

I will specify equation (2) as a combination of a combat function and a tribute function. The combat function describes the outcome of confrontations between rebel and government forces. I adopt a simplified version of the combat function used by Konrad and Skaperdas (1998), with the outcome being described by $r/(r+g)$. Conditional on the outcome of combat, the rebel organization receives a tribute that depends linearly on the value of natural resource exports. Hence, net income from rebellion is

$$N = [rny/(r+g)] - r\beta y^{1+f}. \tag{5}$$

The government supplies protection labor with some consideration for its need and subject to some budget constraint. Let the government get revenue partly by taxing natural resource exports and partly by taxing other income, the tax rate on the former being higher than on the latter. Reflecting observed fiscal patterns, I assume that for a given structure of income, the share of tax revenue in income rises with income. Total tax revenue, T, is thus an increasing function of both national income and the share of income generated by natural resource exports:

$$T = ty^{\theta} + \tau ny, \ \theta > 1. \tag{6}$$

The government allocates a proportion of its tax revenue to purchase protection labor. I will assume that prior to rebellion and for a given structure of the economy, the proportion allocated to protection is linear in revenue. However, recognizing that natural resources increase the risk of predation, the government spends a higher proportion of its revenue on defense, the higher is the share of natural resource exports in income. I formulate this by introducing an exponential term, e^n, which multiplies the share of expenditure devoted to defense. The cost of labor for the government army is assumed to be a linear function of income. Whereas the rebel organization must recruit rapidly and so needs to be ethnically selective to ensure cohesion, the government army is assumed to be in steady state prior to rebellion and so will have had time to overcome its problems of cohesion without resorting to ethnically exclusive recruitment. Its wage rate, w_g, is therefore simply a linear function of income:

$$w_g = \beta y. \tag{7}$$

The size of the government army is therefore

$$g = \lambda e^n T / \beta y. \tag{8}$$

Government forces constitute an active threat to rebel survival. Unlike criminals engaged in household theft and protection rackets, rebels need to be able to defend themselves against government forces. Rebel forces must therefore exceed some

critical level necessary for survival, and this is evidently relative to government forces. I will assume that this critical relationship is proportional:

$$r \geq \alpha g. \tag{9}$$

If this condition is binding, then the size of the rebel labor force becomes determined by the government's choice of its labor force, subject to the rebel organization meeting the nonnegative profits constraint. When the rebel organization is first established, its labor force must grow from zero to αg before it can safely operate as a predator. Once it reaches this size, it is financially viable as a predator. This follows because there are diminishing returns to rebel labor. Hence, if the rebellion is financially viable at any scale, which is a necessary condition for its existence, it must also be financially viable at the minimum size at which it meets the survival constraint. The rebel leader may choose to expand the rebellion beyond this size, but operations will start once this size is reached. Hence, financial viability at this minimum size is a necessary condition for the existence of rebellion. Substituting, this condition requires that

$$y^f e^n (1+\alpha)\lambda[t/n)y^{\theta-1} + \tau)] < 1. \tag{10}$$

Differentiating the left hand side (LHS) of equation (10) with respect to income, y, the derivative is unambiguously positive given that $\theta > 1$ and $f \geq 0$. Hence, for given frequency distributions of the values of the other variables and parameters, the higher is the level of income, the lower is the likelihood that rebellion is financially viable. Richer societies are safer.

Differentiating the LHS of (10) with respect to the structure of income, n, yields the ambiguously signed expression (11):

$$\partial(10)/\partial n = y^f e^n (1+\alpha)\lambda \left\{[(t/n))y^{\theta-1} + \tau)] - (t/n^2)y^{\theta-1}\right\}. \tag{11}$$

In the neighborhood of $n = 0$, (11) is strictly negative, but (10) is not satisfied because the LHS tends to infinity as $n \to 0$. Thus, with natural resources a negligible share of income, rebellion cannot be financially viable, but as the natural resource share of income increases from this level, financial viability becomes more likely. However, in the neighborhood of $n = 1$, (11) is strictly positive. That is, the likelihood that the financial viability condition is satisfied decreases as the share of natural resources in income approaches unity. The financial viability condition may or may not be satisfied in the neighborhood of $n = 1$. Hence, as n increases from 0 to unity, the likelihood of financial viability is initially negligible but increasing, but at some value of n less than unity, the likelihood peaks and begins to decrease. There are thus three possibilities, depending on the values of other variables and parameters. The financial viability condition may not be satisfied over the entire range of n; there may be a range between n^* and n^{**} ($0 < n^* < n^{**} < 1$) over which rebellion is financially viable; there may be some critical value of n, n^{***} ($0 < n^{***} < 1$), above which rebellion is financially viable.

Although (10) provides a condition for the financial viability of a rebellion at its minimum size of becoming operational, it does not address any subsequent escalation or contraction of the opposing forces. I have already assumed that government military

expenditure is increasing in the anticipated risk of rebellion, as proxied by the share of natural resource exports in income. If the risk turns into an eventuality, it is consistent to assume that the government will react, at least initially, by further increasing its military spending. Konrad and Skaperdas (1998) show that their combat function has a simple implication for how rebel forces respond to any increase in government forces. Whether the rebel labor force expands or decreases in response to an increase in government forces is ambiguous, depending on whether $r \gtrless g$. For low values of r, an increase in government forces reduces rebel labor, whereas for high values, it increases rebel labor. Although the condition $r \gtrless g$ is specific to the particular function, Skaperdas (1996) shows this pattern to be more general.

To summarize, the occurrence of war depends on the product of the rebel and the government labor force exceeding a certain threshold. The government will always choose to have an army, although its size will depend both on tax revenue and the risk of rebellion. The rebel leader will only establish an organization if it can survive in the face of government forces and make a profit. If rebellion is viable, its size will depend on the endowment of natural resources, the size of the government army, and the social constraints on rebel recruitment.

Figures 1 through 4 provide a graphical depiction of the interaction between government and rebel forces. In each, the space is the size of the two forces, the vertical axis representing rebel forces, r, and the horizontal axis government forces, g. Figure 1 depicts how the four behavioral regimes that have been introduced above create distinct zones of behavior. The function $D(rg) = 1{,}000$ shows the critical product of the two labor forces above which conflict meets the empirical criteria for civil war. The function $r = \alpha g$ depicts the survival condition: if rebel forces fall below this, they cannot survive against government forces and so there is rebel exit. The function $r = g$ shows the critical level of rebel forces above which rebels react to an increase in government forces by increasing their own forces as opposed to reducing them. The function $r < (ny/w_r) - g$ encapsulates the financial viability constraint. This is simply equation (10) before r, g, and w_r are solved out. The two shaded zones show the two regions in which civil war can occur. In the upper region, there is an arms race of mutual escalation, and in the lower region, the rebel forces contract in response to an increase in government forces. Outside these two zones, rebellion is either too small to count as a civil war or militarily or financially unviable.

Figure 2 introduces the government and rebel reaction functions. The government reaction function, $g(r)$, originates from the g axis at the size of government forces chosen in the absence of a rebellion, g_0—namely, the size given in equation (8). It then slopes upwards, indicating that the government will increase its forces from this size in response to the size of rebellion. The rebel reaction function, $r(g)$, shows the reaction of the rebel organization to changes in the size of government forces. Initially, with government forces of g_0, rebellion is financially viable: suppose r_1 to be the financially optimal size of the rebel organization. However, even before reaching this size, the rebel organization will start predatory operations: once it has grown to r_0, it has the scale necessary to meet the survival constraint. This is given by B, which is vertically above the starting point of the government reaction function. In Figure 2, the initially

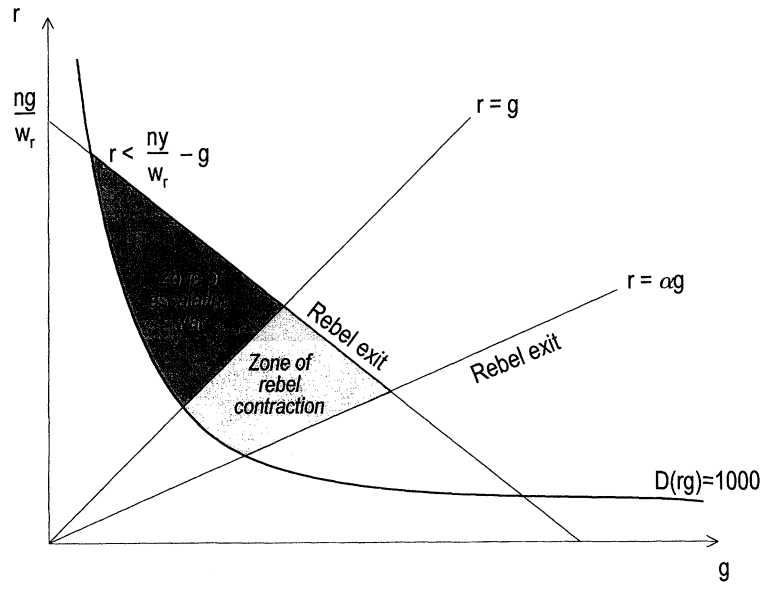

Figure 1: Zones of Civil War

optimal size of rebel forces, r_1, is depicted as being in the zone of rebel contraction. Hence, were the rebel forces at this optimal size, in response to the increase in government forces, the rebel organization would like to contract its own forces. However, the rebel organization is initially below this optimum at r_0. Because the survival constraint is binding at r_0, the expansion in government forces requires the rebel organization to expand correspondingly to ensure its survival. Hence, the optimal size of rebel forces declines from r_1 along the path AC, whereas the actual size of rebel forces increases from r_0 along the path BC partly as they are expanded toward this (declining) optimum and partly as they are required to expand to meet the tightening survival constraint. At C, the optimal size and the minimum necessary size converge. As government forces continue to expand beyond this point, the rebel organization would prefer to continue to reduce its forces but cannot do so because the binding survival constraint requires further expansion. In Figure 2, the reaction functions are drawn such that this process of escalating war reaches a Nash equilibrium at E_1, which is below the level of combat mortality necessary for classification as a civil war.

In Figure 3, the government reaction function is displaced to the right: for example, income may be higher, and the initial rebel optimum, A, is depicted in the zone of escalation. The rebel optimum follows the path AC, whereas the constrained minimum follows the path BC. The Nash equilibrium, E_2, generates a sustained civil war in which

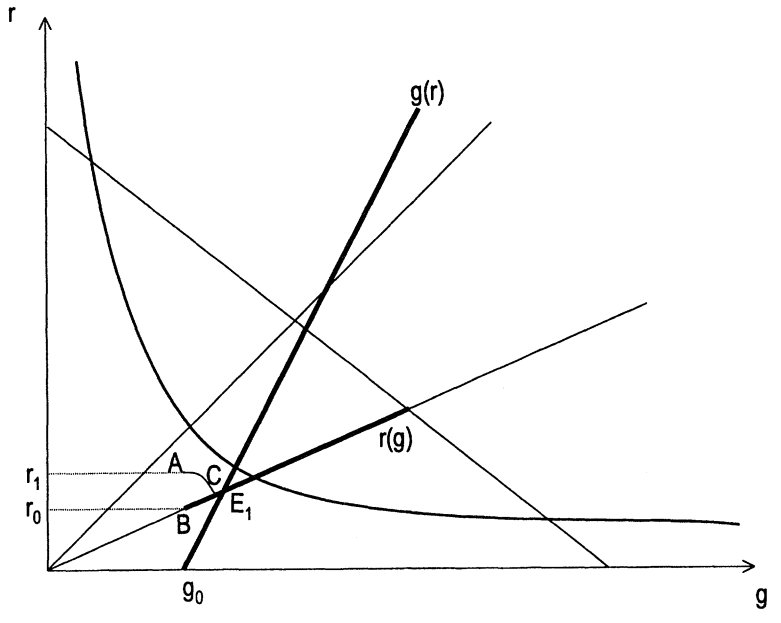

Figure 2: Reaction Functions: Equilibrium at Conflict below the Level of Civil War

the survival constraint happens not to be binding. The mutual escalation of forces is depicted by the dashed line BE_2.

In Figure 4, the government reaction function is further displaced to the right. This produces a temporary civil war. The rebel organization is established at the minimum size necessary to satisfy the survival constraint and initially expands to ensure its continuing survival in response to the expansion of government forces. However, along the expansion path, the rebel organization breaches the financial viability constraint before its reaction function intersects with that of the government. Hence, the rebellion collapses, the end-of-conflict equilibrium being at E_3. The rebellion at its peak is large enough to get classified as a civil war, but it is not sustained.

THE MODEL AND THE "STYLIZED FACTS"

I now consider whether the implications of the model are broadly consistent with the four stylized facts.

The first stylized fact is that controlling for other characteristics, the incidence of civil conflict is lower in societies with higher levels of per capita income. This follows directly from (10): as noted, richer societies are predicted to have a lower risk of conflict. This is a surprisingly difficult result to get into a simple model. In the present model, the nonneutrality of income as between the rebel organization and the govern-

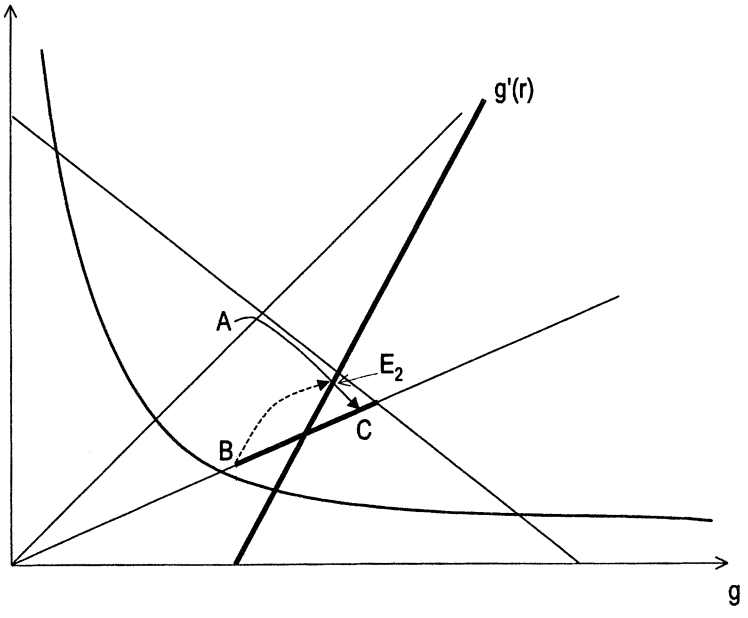

Figure 3: Equilibrium at Civil War

ment results partly from the assumption that the government and the rebel leader face differing constraints in recruitment and, more especially, from the assumption that tax revenue rises more than proportionately in income. There would, however, be other ways of getting such a result to hold. For example, the rebels and the government could use differing military technologies. The government could have exclusive use of an airforce so that its forces were more capital intensive than those of the rebels. Rising labor costs would therefore differentially disadvantage the rebels.

The second stylized fact is that income inequality increases household theft while having no effect on rebellion. That household inequality is associated with a higher incidence of household theft is unsurprising. Such a result would be expected from standard features of crime models such as the opportunity cost of criminal labor and the rewards from theft. In the present model, there are no forces for a positive effect of inequality on rebellion: the objective of rebellion is not social justice as objectively measured by greater equality of household incomes but the capture of natural resource rents.

The third stylized fact is that natural resource exports increase the risk of conflict unless the resource endowment is very large relative to the economy. I have already shown that this follows from the condition for financial viability of rebellion. Starting from a low endowment of natural resources, an increase in the endowment will initially unambiguously raise the profitability of conflict but will eventually advantage the government sufficiently to breach the financial viability condition.

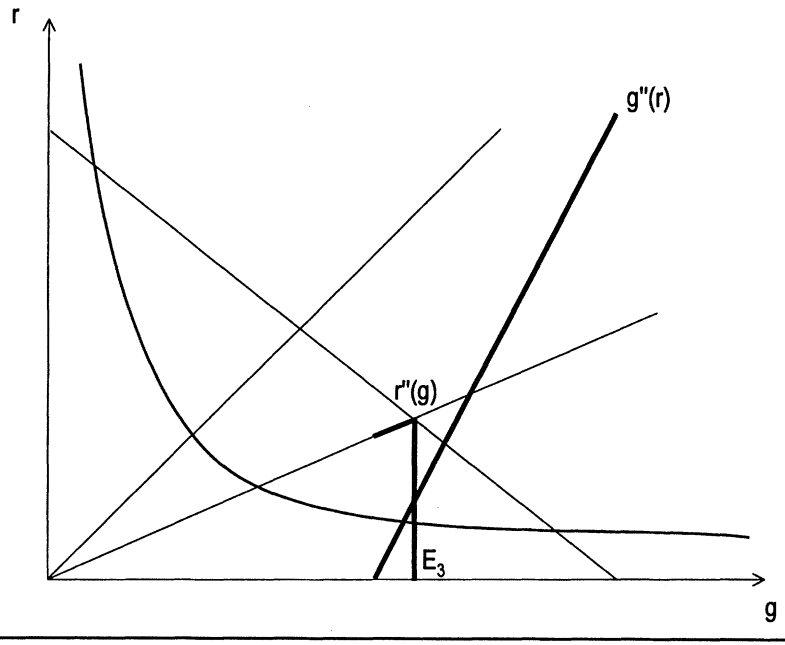

Figure 4: Equilibrium at Rebel Financial Collapse

The final stylized fact is that although rebellions appear not to be caused by objective grievances, rebel organizations appear to be group specific and to invoke group grievance in their discourse. The present model provides some basis for this in introducing constraints on rebel cohesion. By restricting their recruitment to a single group and by emphasizing group identity, rebel leaders may reduce their problem of maintaining organizational cohesion. Far from seeking to avenge grievance, rebel leaders need to incite grievance for their business to be profitable.

THE ENTRY THRESHOLD FOR REBELLION

The "survival condition" of (9), combined with the minimum size of the government army determined by (8), yields an entry threshold for rebellion. The rebel organization must be larger than a certain size to function. Even in conditions under which a large rebel group is profitable, a small rebel group risks getting eliminated. Hence, rebellion faces the organizational problem of surmounting an entry threshold.

The existence of an entry threshold for the economic activity of rebellion is not in itself remarkable: many economic activities have such entry barriers. However, in the context of an illegal activity, such a threshold becomes much more important than in the normal context of industrial organization. If there is an entry threshold in a particular industrial sector, an existing large firm in another sector can simply enter at the

appropriate scale, or a bank can finance a start-up at such a scale. By contrast, rebel movements usually have to grow from small origins using extra-legal means. The model suggests that during the early stages of this growth, they are liable to be unviable. If they engage in predation of natural resources, they will be defeated by government forces, but if they do not engage in predation, they will not receive an income. Rebel movements thus need to finance an initial phase of growth during which they are unprofitable. Because they will not have access to any of the conventional means of start-up finance, the entry threshold can be expected normally to prevent rebellion.

The model thus predicts that the sort of profitable rebellions that it has analyzed cannot occur. Yet because the predictions seem to be broadly consistent with the evidence, it may be that those rebel movements that are observed empirically will be the exceptions that have somehow surmounted this threshold problem. Evidently, what is missing above is a theory of start-up finance for rebellion. I now suggest three ways in which the threshold might be surmounted.

First, rebel movements might initially finance themselves by criminal activities, evolving to natural resource predation only once they have passed the threshold. In effect, mafias might grow from protection rackets into more ambitious challenges to government military forces. It is perhaps possible to interpret the growth of the Medellin drugs cartel in Columbia and the Lord's Resistance Army in Uganda in this way, although it is hard to see the crime-to-rebellion story as a general phenomenon. As discussed above, there are probably diseconomies of scale in criminal activities, so that it will be difficult to build a large organization based on such financing.

Second, rebel movements might be pump-primed by foreign governments, whether hostile neighbors or ideological opponents, which see an advantage in generating rebellion. This is evidently common; for example, RENAMO was initially financed by the government of Rhodesia but was then able to sustain itself when this funding source ended. The presence of several armies of foreign governments in the Democratic Republic of the Congo, allied to somewhat token Congolese rebel groups, and indeed the analogous origin of the Kabila government constitute more recent examples. Probably most rebel movements have some degree of support from foreign governments.

Third, rebel movements might initially be financed either by their own members or by charitable contributions from supporters. This is evidently facilitated if the rebel movement represents a "cause" other than just the enrichment of its fighters from subsequent predation. A particularly promising source of charitable finance is from diasporas in developed economies. Diasporas have often arisen due to emigration in response to conflict and hence tend to harbor historical animosities that have become dormant in the original population. Hence, a political entrepreneur seeking to fund a loot-seeking rebellion may need to rekindle dormant grievances to generate start-up finance. This may be reconciled with the empirical evidence that grievance, as proxied by ethnic, religious, and income fractionalization, is not a cause of conflict. Dormant grievance may be sufficiently widespread that it is almost universally exploitable. Rebel groups may need to harness a grievance to get started, but only those that can become profitable through predation are sustainable. Hence, many rebel groups would be able to "explain" (in terms of offering a discourse) their rationale in terms of griev-

ance, although differences in the intensity of grievances between countries would not explain (statistically) differences in the extent of violent conflict.

The existence of entry thresholds for loot-motivated rebellions is somewhat analogous to the existence of the free-rider problem for grievance-motivated rebellions: each is a major barrier. This suggests that grievance and greed may have a symbiotic relationship in rebellion: to get started, rebellion needs grievance, whereas to be sustained, it needs greed.

CONCLUSION

In this article, I have set out a simple model of rebellion in which the objective is purely economic—namely, the predation of natural resources. Such rebellion is a variety of crime, but it is distinctive. Although rebellion is modeled as a criminal activity—the only difference from common crime being that predation is directed against natural resources instead of household wealth—this leads to substantial divergences. Because of the differential degrees of geographic concentration of household and natural resource loot and hence differences in the difficulty of defense, household crime will be organized as a small-scale activity and natural resource crime as a large-scale activity.

The rebellion-as-crime approach is now common in economics, but it stands in sharp contrast to the rebellion-as-justice seeking in much of the popular literature. Recent empirical evidence suggests that economic motivation, especially natural resource predation, may be more important as a cause of conflict than has been recognized. In the model, rebels are predatory on natural resources, the government responds by attempting to defend them, and this gives rise to violent conflict. Although the model is very simple, it yields behavior that is in some interesting respects consistent with the observed pattern of conflict. I use the model to account for four "stylized facts" that seem to be empirical regularities in large-scale civil conflict.

The model predicts an entry threshold for predatory rebellion. I suggest that one of the ways in which such a threshold can be overcome is to harness grievance. The political entrepreneurs who instigate rebellions may seek start-up finance from a constituency that is indeed willing to pay for vengeance. Hence, greed may need to incite grievance. Thus, grievance and greed may be necessary for sustained rebellion: grievance may enable a rebel organization to grow to the point at which it is viable as a predator; greed may sustain the organization once it has reached this point.

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